

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (currently amended) A processable rubber composition comprising a cured fluorocarbon elastomer dispersed in a matrix comprising a thermoplastic material, wherein:

the thermoplastic material comprises a fully fluorinated melt-processable thermoplastic polymer and a partially fluorinated melt-processable thermoplastic polymer; and

the cured fluorocarbon elastomer is present at a level of greater than or equal to 35% by weight based on the total weight of cured fluorocarbon elastomer and thermoplastic material.
2. (original) A composition according to Claim 1, wherein the cured fluorocarbon elastomer is present at a level of greater than or equal to 50% by weight.
3. (original) A composition according to Claim 1, wherein the composition exhibits a single melting temperature of less than 305°C.
4. (original) A composition according to Claim 3, wherein the composition exhibits a single melting temperature of less than 290°C.

5. (original) A composition according to Claim 4, wherein the composition exhibits a single melting temperature of less than 250°C.
6. (original) A composition according to Claim 1, wherein the thermoplastic material comprises more than 60 wt % fluorine.
7. (original) A composition according to Claim 1, wherein the thermoplastic material comprises 10-90% by weight of the fully fluorinated polymer.
8. (original) A composition according to Claim 1, wherein the ratio of the weight of the fully fluorinated polymer to the weight of the partially fluorinated polymer in the matrix ranges from 1:9 to 9:1.
9. (original) A composition according to Claim 8, wherein the ratio of the weight of the fully fluorinated polymer to the weight of the partially fluorinated polymer in the matrix ranges from 1:2 to 2:1.
10. (original) A method according to Claim 1, wherein the fluorocarbon elastomer comprises repeating units derived from vinylidene fluoride and hexafluoropropylene.
11. (original) A method according to Claim 10, wherein the fluorocarbon elastomer further comprises repeating units derived from tetrafluoroethylene.

12. (currently amended) A ~~method~~ composition according to Claim 1, wherein the fluorocarbon elastomer is selected from the group consisting of: VDF/HFP, VDF/HFP/TFE, VDF/PFVE/TFE, TFE/Pr, TFE/Pr/VDF, TFE/Et/PFVE/VDF, TFE/Et/PFVE, TFE/PFVE, and mixtures thereof.
13. (currently amended) A ~~method~~ composition according to Claim 12, wherein the fluorocarbon elastomer also comprises cure site monomers.
14. (currently amended) A ~~method~~ composition according to Claim 1, wherein the thermoplastic material comprises a fully fluorinated polymer selected from the group consisting of PFA, MFA and FEP, and a partially fluorinated polymer selected from the group consisting of polyvinylidene fluoride and copolymers of vinylidene fluoride.
15. (withdrawn - currently amended) A processable rubber composition comprising a cured fluorocarbon elastomer dispersed in a thermoplastic matrix, wherein the thermoplastic matrix comprises a fully fluorinated thermoplastic melt-processable polymer and a partially fluorinated thermoplastic melt-processable polymer; the cured fluorocarbon elastomer is present as a discrete phase or a phase co-continuous with the matrix; and the dimensions of the elastomer phase are less than 10 μm , as measured by atomic force microscopy on cryogenically microtomed cross-sections of shaped articles formed from the processable rubber composition.

16-22. (cancelled)

23. (withdrawn - currently amended) A method for making a processable rubber composition comprising:
- mixing an elastomeric component and a thermoplastic component in the presence of a curative agent, and
- heating during mixing to effect cure of the elastomeric component.
- wherein the elastomeric material comprises a fluorocarbon elastomer; and
- wherein the thermoplastic material is a fluoroplastic blend comprising a fully fluorinated thermoplastic melt-processable polymer and a partially fluorinated thermoplastic melt-processable polymer.

24-39. (cancelled)

40. (withdrawn - currently amended) A shaped article comprising a cured fluorocarbon elastomer dispersed in a matrix comprising a thermoplastic material, wherein the thermoplastic material comprises from about 10 to about 90% by weight of a fully fluorinated thermoplastic melt-processable polymer and from about 10 to about 90% by weight of a partially fluorinated thermoplastic polymer.

41-48. (cancelled)

49. (withdrawn) A method for reducing costs of a manufacturing process for making shaped rubber articles from a processable rubber composition, comprising

recycling scrap material generated during the manufacturing process to make new shaped articles comprising the processable rubber composition,

wherein the processable rubber composition is the product of dynamic vulcanization of a fluorocarbon elastomer in the presence of a thermoplastic material, wherein the thermoplastic material comprises from about 10 to about 90% by weight of a fully fluorinated thermoplastic polymer and from about 10 to about 90% by weight of a partially fluorinated thermoplastic polymer.

50-53. (cancelled)

54. (withdrawn – currently amended) A process of manufacturing shaped plastic articles, comprising
- preparing a processable rubber composition by dynamically vulcanizing a fluorocarbon elastomer in the presence of a fluoroplastic blend comprising a fully fluorinated melt-processable polymer and a partially fluorinated melt-processable polymer;
- melting the rubber composition; and
- fabricating the shaped article from the molten rubber composition with a thermoplastic processing technique.

55-58. (cancelled)

59. (new) A processable rubber composition according to Claim 1, wherein the dimensions of the cured fluorocarbon elastomer are less than 10 μm , as measured by atomic force

microscopy on cryogenically microtomed cross-sections of shaped articles formed from the processable rubber composition.

60. (new) A processable rubber composition according to Claim 59, wherein the dimensions are less than 1 μm .
61. (new) A method for making a processable rubber composition according to Claim 1, comprising:
- mixing an elastomeric component and the thermoplastic material in the presence of a curative agent; and
- heating during mixing to effect cure of the elastomeric component, wherein the elastomeric component comprises a fluorocarbon elastomer.
62. (new) A method according to Claim 61, comprising
- forming a mixture by combining the curative, an uncured or partially cured fluorocarbon elastomer and the thermoplastic material; and
- heating the mixture at a temperature and for a time sufficient to effect vulcanization of the elastomer, wherein mechanical energy is applied to mix the mixture during the heating step.
63. (new) A method according to Claim 61, comprising:

mixing the elastomeric component and the thermoplastic material for a time and at a shear rate sufficient to form a dispersion of the elastomeric material in a continuous thermoplastic phase;

adding a curative to the dispersion while continuing the mixing; and

heating the dispersion while continuing to mix the curative, elastomeric material, and thermoplastic material.

64. (new) A shaped article made by thermoplastic processing of a processable rubber composition according to Claim 1.
65. (new) A shaped article according to Claim 64, wherein the hardness of the article is Shore A 50 or greater, the tensile strength of the article is 4 MPa or greater, the modulus at 100% of the article is 4 MPa or greater, or the elongation at break of the article is 10% or greater.
66. (new) A shaped article according to Claim 64, wherein the thermoplastic material comprises from about 10 to about 90% by weight of a fully fluorinated thermoplastic polymer and from about 10 to about 90% by weight of a partially fluorinated thermoplastic polymer.
67. (new) A shaped article according to Claim 64 wherein the cured fluorocarbon elastomer is present at a level of at least 50% by weight based on the total weight of cured fluorocarbon elastomer and thermoplastic polymer.

68. (new) A shaped article according to Claim 64, wherein the fluorocarbon elastomer is selected from the group consisting of: VDF/HFP, VDF/HFP/TFE, VDF/PFVE/TFE, TFE/Pt, TFE/Pt/VDF, TFE/Et/PFVE/VDF, TFE/Et/PFVE, TFE/PFVE, and mixtures thereof.
69. (new) A seal according to Claim 64.
70. (new) An O-ring according to Claim 64.
71. (new) A gasket according to Claim 64.
72. (new) A hose according to Claim 64.
73. (new) A process of manufacturing a shaped plastic article, comprising
preparing a processable rubber composition according to Claim 1 by dynamically
vulcanizing a fluorocarbon elastomer in the presence of the fluoroplastic material;
melting the rubber composition; and
fabricating the shaped article from the molten rubber composition with a thermoplastic
processing technique.
74. (new) A method according to Claim 73, comprising melting the rubber composition at a
temperature below the melting temperature of the fully fluorinated polymer.

75. (new) A method according to Claim 73, comprising melting the rubber at a temperature below 280°C, wherein the fluoroplastic blend comprises more than 65% by weight fluorine.
76. (new) A method according to Claim 73, comprising injection molding the molten rubber composition.
77. (new) A method according to Claim 73, comprising extruding the molten rubber composition.
78. (new) A processable rubber composition comprising a cured fluorocarbon elastomer dispersed in a matrix comprising a thermoplastic material, wherein:
the thermoplastic material comprises a fully fluorinated melt-processable thermoplastic polymer and a partially fluorinated melt-processable thermoplastic polymer; and
the cured fluorocarbon elastomer is present at a level of 50% – 80% by weight based on the total weight of cured fluorocarbon elastomer and thermoplastic material,
wherein the dimensions of the elastomer phase are less than 10 μm , as measured by atomic force microscopy on cryogenically microtomed cross-sections of shaped articles formed from the processable rubber composition, and
wherein the composition exhibits a single melting temperature of less than 250°C.

79. (new) A composition according to Claim 78, wherein the ratio of the weight of the fully fluorinated polymer to the weight of the partially fluorinated polymer in the matrix ranges from 1:2 to 2:1.
80. (new) A composition according to Claim 78, wherein the fluorocarbon elastomer comprises repeating units derived from vinylidene fluoride and hexafluoropropylene.
81. (new) A composition according to Claim 80, wherein the fluorocarbon elastomer further comprises repeating units derived from tetrafluoroethylene.
82. (new) A composition according to Claim 78, wherein the fluorocarbon elastomer is selected from the group consisting of: VDF/HFP, VDF/HFP/TFE, VDF/PFVE/TFE, TFE/Pr, TFE/Pr/VDF, TFE/Et/PFVE/VDF, TFE/Et/PFVE, TFE/PFVE, and mixtures thereof.
83. (new) A composition according to Claim 82, wherein the fluorocarbon elastomer also comprises cure site monomers.
84. (new) A composition according to Claim 78, wherein the thermoplastic material comprises a fully fluorinated polymer selected from the group consisting of PFA, MFA and FEP, and a partially fluorinated polymer selected from the group consisting of polyvinylidene fluoride and copolymers of vinylidene fluoride.